BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT

BRIDGE COURSE MATHEMATICS-I
(Common to all branches)
(Effective from the academic year 2018-19)

Subject Code : UMA330M | **CIE Marks : 50**
Contact Hours/Week : 3L | **SEE Marks: 50**
Total Hours:40 | **Exam Hours : 03**
Semester : III | **Credits: Mandatory**

Course Learning Objectives: This course (**UMA330M**) will enable students to master the basic tools of calculus and vectors to become skilled for solving problems in science and engineering.

Differential Calculus: **15 Hours**

Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Taylor's and Maclaurin's series expansions for one variable (statements only)without proof. problems

Partial differentiation : Introduction to function of several variables, Partial derivatives; Euler's theorem - problems. Total derivatives-differentiation of composite functions. Jacobians-problems,

Integral Calculus: **15 Hours**

Reduction formula $\int \sin^n xdx$, $\int \cos^n xdx$, $\int \tan^n xdx$ and $\int \sin^n x \cos^n xdx$. Evaluation of double and triple integrals. Area bounded by the curve.

Beta and Gamma functions: Definitions, Relation between beta and gamma functions-problems.

Vector Calculus: **10 Hours**

Vector Differentiation: Scalar and vector fields**.** Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- problems

Text Books:

- B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
- E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. Thomas' Calculus: Early Transcendentals, Single Variable (13th Edition)
2. Calculus: Early Transcendentals James Stewart
3. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
4. B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
5. Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
6. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.

Course Outcomes: On completion of this course, students are able to:

CO1: Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.

CO2: Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.

CO3: Apply the concept of multiple integrals and their usage in computing the area and volumes.

CO4 : Apply the knowledge of vector calculus to solve the engineering problems

Question paper pattern for SEE

1. Total of eight questions uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered

Course Outcomes	**Programme Outcomes**

	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	--	--	--	--	--	--	--	--	--	--

BASAVESHWAR ENGINEERING COLLEGE (AUTONOMOUS), BAGALKOT

BRIDGE COURSE MATHEMATICS-II
(Common to all branches)
(Effective from the academic year 2018-19)

Subject Code : UMA430M **CIE Marks : 50**
Contact Hours/Week : 03 **SEE Marks: 50**
Total Hours:40 **Exam Hours : 03**
Semester : IV **Credits: Mandatory**

Course Learning Objectives: The purpose of the course **UMA430M** is to facilitate the students with concrete foundation of differential equations and Laplace transform to acquire the knowledge of these mathematical tools.

Ordinary differential equations of first order: **15 Hours**
Variable seperable,Homogeneous.Exact form and reducible to exact differential equations. Linear and Bernoulli's equation.

Differential Equations of higher order:
Second and higher order linear ODE's with constant coefficients-Inverse differential operator, method of variation of parameters(second order); Cauchy's and Legendre homogeneous equations.

Laplace Transform: **15 Hours**
Introduction, Definition of Laplace Transform, Laplace Transform of Elementary functions, Properties: Shifting, differentiation, Integral and division by t. Periodic function, Heaviside's Unit step function

Inverse Laplace transforms –
Properties. Convolution theorem. Solutions of linear differential equations

Partial Differential Equations(PDE's): **10 Hours**
Introduction to PDE : Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Solution of Lagrange's linear PDE, method of separation of variables,

Text Books:

- B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
- E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.

Reference books:

1. Thomas' Calculus: Early Transcendentals, Single Variable (13th Edition)
2. Calculus: Early Transcendentals James Stewart
3. C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
4. B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
5. Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
6. N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.

Course Outcomes: On completion of this course, students are able to:

CO1: Explain various physical models through first and higher order differential equations and solve such linear ordinary differential equations.
CO2: Apply the Laplace transform techniques to solve differential equations.
CO3: Understand a variety of partial differential equations and solution by exact methods.

CO4: solve PDE by direct integration and Solution of Lagrange's linear PDE, method of separation of variables

Question paper pattern for SEE

1. Total of eight questions uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered

Course Outcomes	**Programme Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	--	--	--	--	--	--	--	--	--	--

BASAVESHWAR ENGINEERING COLLEGE , BAGALKOTE

ENGINEERING MATHEMATICS-I
(CALCULUS)

(Common to all branches)
(Effective from the academic year 2018-19)

Subject Code : UMA161C | **CIE Marks : 50**
Contact Hours/Week : 05(3L+2T) | **SEE Marks: 50**
Total Hours:40 | **Exam Hours : 03**
Semester : I | **Credits: 04(3-2-0)**

Course Learning Objectives: This course (**UMA161C**) will enable students to master the basic tools of calculus and vectors to become skilled for solving problems in science and engineering.

UNIT-I L-10 Hours, T-06 Hours

Differential Calculus-1:
Review of elementary calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature- Cartesian, parametric and polar forms (without proof) Taylor's and Maclaurin's series expansions for one variable (statements only). problems

UNIT-II L-10 Hours, T-08 Hours

Differential Calculus-2:
Introduction to function of several variables, Partial differentiation; Total derivatives-differentiation of composite functions. Maxima and minima for a function of two variables and its applications; Method of Lagrange multipliers with one subsidiary condition, Jacobians-problems, Errors and approximations.

UNIT-III L-10 Hours, T-06 Hours

Integral Calculus: Multiple integrals: Evaluation of double and triple integrals. Evaluation of double integrals-change of order of integration and changing into polar, spherical and cylindrical co-ordinates. Applications to find area, & volume.
Beta and Gamma functions: definitions, Relation between beta and gamma functions-problems.

UNIT-IV L-10 Hours, T-06 Hours

Vector Calculus:
Vector Differentiation: Scalar and vector fields**.** Gradient, directional derivative; curl and divergence-physical interpretation; solenoidal and irrotational vector fields- problems
Vector Integration: Line integrals, surface integrals and volume integrals. Green's theorem, Stoke's theorem, Gauss divergence theorem (without proof) - problems.

References:

- B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
- E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.
- Thomas' Calculus: Early Transcendentals, Single Variable (13th Edition)
- Calculus: Early Transcendentals James Stewart
- C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
- B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
- Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
- N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.

Course Outcomes: On completion of this course, students are able to:

CO1: Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.

CO2: Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.

CO3: Apply the concept of multiple integrals and their usage in computing the area and volumes.

CO4 : Apply the knowledge of vector calculus to solve the engineering problems

CO5: exhibit the interdependence of line, surface and volume integrals.

Question paper pattern for SEE

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	--	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	--	--	--	--	--	--	--	--

BASAVESHWAR ENGINEERING COLLEGE , BAGALKOTE

ENGINEERING MATHEMATICS-II

(Differential Equations and Laplace Transform)
(Common to all branches)
(Effective from the academic year 2018-19)

Subject Code : UMA261C | **CIE Marks : 50**
Contact Hours/Week : 05(3L+2T) | **SEE Marks: 50**
Total Hours:40 | **Exam Hours : 03**
Semester : II | **Credits: 04(3-2-0)**

Course Learning Objectives: The purpose of the course **UMA261C** is to facilitate the students with concrete foundation of Liner Algebra, differential equations and Laplace transform to acquire the knowledge of these mathematical tools.

UNIT-I **L-10 Hours, T-06 Hours**

Elementary Linear Algebra:
Recap of Matrices: Rank of a matrix-echelon form. Solution of system of linear equations – consistency. Gauss-elimination method and Gauss-Seidel method. Eigen values and eigen vectors.

Ordinary differential equations of first order:
Exact and reducible to exact differential equations. Linear and Bernoulli's equation. Applications of ODE's-orthogonal trajectories, Newton's law of cooling and L-R circuits.

UNIT-II **L-10 Hours, T-08 Hours**

Differential Equations of higher order:
Second and higher order linear ODE's with constant coefficients-Inverse differential operator, method of variation of parameters(second order); Cauchy's and Legendre homogeneous equations. Applications: Simple harmonic motion and LCR circuits.

UNIT-III **L-10 Hours, T-06 Hours**

Partial Differential Equations(PDE's):
Introduction to PDE : Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Solution of Lagrange's linear PDE, method of separation of variables, Derivation of one dimensional heat and wave equations and solutions by the method of separation of variables.

UNIT-IV **L-10 Hours, T-06 Hours**

Laplace Transform: **10 hours**
Introduction, Definition of Laplace Transform, Laplace Transform of Elementary functions, Properties: Shifting, differentiation, Integral and division by t. Periodic function, Heaviside's Unit step function
Inverse Laplace transforms –
Properties. Convolution theorem. Solutions of linear differential equations-Applications toEngineering problems.

References:

- B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Ed., 2015.
- E. Kreyszig: Advanced Engineering Mathematics, John Wiley & Sons, 10th Ed.(Reprint), 2016.
- Thomas' Calculus: Early Transcendentals, Single Variable (13th Edition)
- Calculus: Early Transcendentals James Stewart
- C.Ray Wylie, Louis C.Barrett : "Advanced Engineering Mathematics", 6th Edition, McGraw-Hill Book Co., New York, 1995.
- B.V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
- Veerarajan T.," Engineering Mathematics for First year", Tata McGraw-Hill, 2008.
- N.P.Bali and Manish Goyal: A Text Book of Engineering Mathematics, Laxmi Publishers, 7th Ed., 2010.

Course Outcomes: On completion of this course, students are able to:

CO1: Apply the knowledge of matrix theory for solving system of linear equations and compute eigen values and eigen vectors required for matrix.

CO2: Explain various physical models through first and higher order differential equations and solve such linear ordinary differential equations.

CO3: Understand a variety of partial differential equations and solution by exact methods.

CO4: Able to derive heat and wave equation and solve by method of separation of variables

CO5: Apply the Laplace transform techniques to solve differential equations.

Question paper pattern for SEE

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	--	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	--	--	--	--	--	--	--	--

UMA301C: ENGINEERING MATHEMATICS-III

4 Credits (4-0-0)

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various engineering fields by making them

- to understand the method of solving algebraic, transcendental equations .
- to determine the approximate value of the derivative & definite integral for a given data using numerical techniques.
- able to expand the given periodic function defined in the given range in terms of sine and cosine multiple of terms as a Fourier series.
- able to extremise the functional using integration technique.
- able to form and solve the partial differential equation using different analytical techniques.
- to solve different forms of heat and wave equations.

Course outcomes:

On completion of this course, students are able

- to know how root finding techniques can be used to solve practical engineering problems.
- to apply the concept of numerical analysis to find the relative strengths and weaknesses of each computation method and know which are most applicable for given problem.
- to apply the analytical technique to express periodic function as a Fourier sine and cosine series.
- to apply partial differential techniques to solve the physical engineering problems.
- to implement integration technique to determine the extreme values of a functional.

UNIT-I

Numerical Analysis: 13 Hours

Bisection Method, Newton-Raphson method.Finite differences, forward and backward difference operators (no derivations on relations between operators) Newton-Gregory forward and backward interpolation formulae. (without proof), Lagrange's and Newton's divided difference interpolation formulae (without proof) Numerical differentiation using Newton's forward and backward formulae-problems.

Numerical solutions of first order ODE :

Taylors Series Method, Euler's and Modified Euler's method, Runge-Kutta 4th order method, Milne's predictor and corrector method (problems only).

UNIT-II

Numerical integration: **13 Hours**

Trapezoidal rule, Simpson's one third rule, Simpson's three eighth rule and Weddle's rule (no derivation of any formulae)-problems.

Fourier Series:

Periodic functions, Conditions for Fourier series expansions, Fourier series expansion of continuous and functions having finite number of discontinuities, even and odd functions. Half-range series, practical harmonic analysis.

UNIT-III

Fourier transforms: **13 Hours**

Infinite Fourier transforms and inverse Fourier transforms-simple properties, complex Fourier transform, Fourier sine and Fourier cosine transforms, Inverse Fourier sine and cosine transforms

Calculus of Variations

Variation of a function and a functional, extremal of a functional, variational problems, Euler's equation, standard variational problems including geodesics, minimal surface of revolution, hanging chain and Brachistochrone problems.

UNIT-IV

Partial Differential Equations: **13 Hours**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions, Solution of equation of the type: Pp + Qq = R, Charpit's method. Solution of PDEs by the method of separation of variables.

Derivation of one-dimensional heat and wave equations. Numerical solutions of one-dimensional heat and wave equations by explicit method, Laplace equation by using standard five point formula.

Total 52 Hours

Resources:

1. Numerical Methods for Engineers by Steven C Chapra &Raymond P Canale.
2. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.
3. Advanced Engineering Mathematics By H. K. Das, S. Chand & company Ltd. Ram Nagar, New Delhi.
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)

Question paper pattern for SEE

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Course Outcomes	Programme Outcomes											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	---	--	--	--	--	--	--	--

UMA401C: ENGINEERING MATHEMATICS-IV

4 Credits (4-0-0)

Course Objectives:

To enable the students to apply the knowledge of Mathematics in various Engineering fields by making them

- to identify the functions in engineering problems as analytic function and their study as a functions of a complex variables.
- to specify some difficult integration that appear in applications can be solved by complex integration.
- to understand the method of finding the series solution of Bessel's and Legendre's differential equations.
- to form a specific relation for the given group of data using least square sense method.
- to specify probability is an area of study which involves predicting the relative likely hood of various outcomes.

Course outcomes:

On completion of this course, students are able

- to solve Engineering problems using complex variable techniques.
- to evaluate the line integrals of a complex valued function.
- to apply series solution of Bessel's and Legendre's differential equations for BVP arising in cylindrical and spherical coordinate system respectively.
- to apply the least square sense method to construct the specific relation for the given group of data.
- to apply the concept of probability to find the physical significance of various distribution phenomena.

UNIT-I

Complex Variables: 13 Hours

Analytic function, Cauchy-Reimann equations in Cartesian and polar forms. Construction of analytic function (Cartesian and polar forms), Discussion of conformal transformations: z^2, e^z and $z + a^2/z$ *(z # 0),* Bilinear transformations.

Complex Integration: Line integral, Cauchy's theorem - corollaries, Cauchy's integral formula. Taylor's and Laurent's series (statements only), singularities, poles, calculation of residues, Cauchy's residue theorem (without proof) - problems.

UNIT-II

Special Functions: **13 Hours**

Series solution of Bessel's differential equation, recurrence formulae, generating function, orthogonal property, Bessel's integral formula. Series solution of Legendre's differential equation, recurrence formulae, generating function, orthogonal property, Rodrigue's formula.

UNIT-III

Statistics and Probability: **13 Hours**

13 Hours

Curve fitting by the method of least squares: $y = a + bx$, $y = ab^x$, $y = a + bx + cx^2$. Correlation, expression for the rank correlation coefficient and regression.

Probability: addition rule, conditional probability, multiplication rule, Baye's rule.

UNIT-IV

Probability distributions: **13 Hours**

Discrete and continuous random variables-Probability density function, Cumulative distribution Function, Binomial distributions Poisson distributions and Normal distributions

Joint Probability Distribution and Markov Chains:

Concept of joint probability, Joint distributions - discrete and continuous random variables, Independent random variables, Problems on expectation and variance.

Markov chains: Introduction, Probability vectors, Stochastic Matrices, Fixed Points and Regular stochastic Matrices, Markov chains, higher transition probabilities, stationary distribution of regular Markov chains and absorbing states.

Total 52 Hours

Resources:

1. Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers, New Delhi.
2. Theory and problems of probability by Seymour Lipschutz (Schaum's Series).
3. Advanced Engineering Mathematics by H. K. Dass
4. Advanced Engineering Mathematics by E Kreyszig (John Wiley & Sons)

5. Probability and stochastic processes by Roy D. Yates and David J. Goodman, wiley India pvt.ltd 2nd edition 2012.
6. A first course in Complex analysis with applications by Dennis G. zill Patrick D shanahan, 2nd edition 2010.
7. Advanced Engineering Mathematics by Peter V. O'Neil.

Question paper pattern for SEE

1. Total of eight questions with two from each unit to be set uniformly covering the entire syllabus.
2. Each question should not have more than four subdivisions.
3. Any five full questions are to be answered choosing at least one from each unit.

Course Outcomes	**Programme Outcomes**											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
CO1	3	2	--	--	--	--	--	--	--	--	--	--
CO2	3	2	--	--	--	--	--	--	--	--	--	--
CO3	3	2	--	--	--	--	--	--	--	--	--	--
CO4	3	2	---	--	--	--	--	--	--	--	--	--
CO5	3	2	--	--	---	--	--	--	--	--	--	--